M. Sc. 4th Semester Examination, 2024

HUMAN PHYSIOLOGY

PAPER – PHY-402.1 & 402.2

Full Marks : 50

Time : 2 hours

Answer **all** questions

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

PAPER – PHY-402.1

(*Cell and Inheritance Biology*)

[*Marks* : 20]

GROUP–A

Answer any **two** questions of the following : 2×2

1. What are adult stem cells ? 2

2. What do you understand by differentiation ? 2

3. Define sphingomyclin ? 2

4. What are microfilaments ? 2

GROUP–B

Answer any **two** questions of the following : 4×2

5. Write down the properties of stem cells. How does the tissue renewal by stem cells take place ? $3 + 1$

6. How are the lateral diffusion of membrane proteins restricted in domains of cell membrane ? 4

7. Briefly describe the cell signaling through ion-channel linked receptor. 4

8. What are motor proteins ? Name the microtubule-based motor proteins. 3 + 1

GROUP – C

Answer any **one** question of the following : 8 × 1

9. What is membrane fluidity ? Discuss the factors that control membrane fluidity ? Write down the full form of FRAP. 2 + 5 + 1

10. Describe the signal transduction mechanism through GPCR where cAMP acts as a second messenger. What is Gq ? 6 + 2

PAPER – PHY-402.2

(*Biotechnology*)

[*Marks* : 20]

GROUP – A

Answer any **two** questions of the following : 2 × 2

11. Differentiate between 1D and 2D gel electrophoresis. 2

12. Define crossing over. What is meant by linkage? 2

13. What is YAC ? 2

14. What are adult stem cells and human embryonic stem cells ? 2

GROUP–B

Answer any **two** questions from the following : 4×2

15. Write a note on RAPD. 4

16. Suppose, *Drosophila* females of genotype Tt Mm Rr were crossed with males of genotype tt mm rr. This led to 1000 progeny of the following types :

TMR	tmr	TMr	tmR	tMR	Tmr	TmR	tMr
244	236	81	89	148	152	23	27

Based on these data, find out the (*i*) parental gametes, single crossover gametes, and double crossover gametes, (*ii*) their gene order,and (*iii*) interference. $1 + 1 + 2$

17. Define transgenic animal. Give an example. What are the procedures by which transgenic animal can be produced ? 1 + 1 + 2

18. Describe the methods and mechanisms of bacterial transformation in laboratory. 4

GROUP–C

Answer any **one** question from the following : 8 × 1

19. Define site directed mutagenesis. Give an example. Write a brief note on (*i*) CRISPR/ Cas9 technology, (*ii*) treansposons. 2 + 1 + 2 + 3

20. Mention the important features of a cloning vector. What do you know about multiple cloning site of a cloning vector ? State the significance of using becteriophages in cloning. 3 + 3 + 2

[Internal Assessment — 10 Marks]